

Advanced  
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# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

LOW FREQUENCY MONITOR  
(for 900MHz Band & 125KHz Transmissions)

MODEL: ITD-34Y  
FCC ID: ST2-DM34Y

September 17, 2012

This report concerns (check one): Original grant <input checked="" type="checkbox"/> Class II change <input type="checkbox"/>	
Equipment type: <u>Low Power Intentional Radiator</u>	
Deferred grant requested per 47 CF 0.457(d)(1)(ii)?    yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	
If yes, defer until: _____ (date)	
Company agrees to notify the Commission by _____ (date)	
of the intended date of announcement of the product so that the grant can be issued on that date.	
Transition Rules Request per 15.37?    yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision.	
Report prepared for:	CENTRAK, INC.
Report prepared by:	Advanced Compliance Lab
Report number:	0048-120904-03



Lab Code: 200101

The test result in this report IS supported and covered by the NVLAP accreditation

## Table of Contents

<b>Report Cover Page .....</b>	<b>1</b>
<b>Table of Contents .....</b>	<b>2</b>
<b>Figures .....</b>	<b>3</b>
<b>1. GENERAL INFORMATION.....</b>	<b>4</b>
1.1 Verification of Compliance.....	4
1.2 Equipment Modifications.....	5
1.3 Product Information .....	6
1.4 Test Methodology.....	6
1.5 Test Facility .....	6
1.6 Test Equipment .....	7
1.7 Statement for the Document Use.....	7
<b>2. PRODUCT LABELING .....</b>	<b>8</b>
<b>3. SYSTEM TEST CONFIGURATION .....</b>	<b>9</b>
3.1 Justification .....	9
3.2 Special Accessories .....	9
3.3 Configuration of Tested System.....	9
<b>4. SYSTEM SCHEMATICS .....</b>	<b>14</b>
<b>5. CONDUCTED EMISSION DATA.....</b>	<b>15</b>
5.1 Test Methods and Conditions .....	15
5.2 Test Data .....	15
<b>6. RADIATED EMISSION DATA .....</b>	<b>19</b>
6.1 Field Strength Calculation .....	19
6.2 Test Methods and Conditions .....	19
6.3 Test Data .....	19
6.4 EUT RECEIVING MODE VERIFICATION .....	26
<b>7. PHOTOS OF TESTED EUT .....</b>	<b>27</b>

## Figures

<b>Figure 2.1 FCC ID Label.....</b>	<b>8</b>
<b>Figure 2.2 Location of Label on Back of the EUT.....</b>	<b>8</b>
<b>Figure 3.1 Radiated Test Setup (a) .....</b>	<b>10</b>
<b>Figure 3.1 Radiated Test Setup (b).....</b>	<b>11</b>
<b>Figure 3.2 Conducted Test Setup (a) .....</b>	<b>12</b>
<b>Figure 3.2 Conducted Test Setup (b).....</b>	<b>12</b>
<b>Figure 4.1 EUT Schematics.....</b>	<b>14</b>
<b>Figure 7.1 Front View .....</b>	<b>28</b>
<b>Figure 7.2 Back View .....</b>	<b>29</b>
<b>Figure 7.3 Cover Open _ Inside View 1 .....</b>	<b>30</b>
<b>Figure 7.4 Cover Removed _ Inside View 2.....</b>	<b>31</b>
<b>Figure 7.5 900MHz &amp; 2.4GHz Main PCB Front Side .....</b>	<b>32</b>
<b>Figure 7.6 125KHz Main PCB Rear Side .....</b>	<b>33</b>
<b>Figure 7.7 900MHz PCB .....</b>	<b>34</b>
<b>Figure 7.8 AC/DC Adaptor .....</b>	<b>35</b>

## **1. GENERAL INFORMATION**

### **1.1 Verification of Compliance**

EUT: LOW FREQUENCY MONITOR

Model: ITD-34Y

Applicant: CENTRAK, INC.

Test Type: FCC Part 15C Sec. 15.209, 15.249 CERTIFICATION

Result: PASS

Tested by: ADVANCED COMPLIANCE LABORATORY

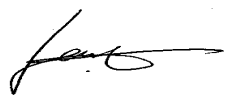
Test Date: September 17, 2012

Report Number: 0048-120904-03

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty $u_c$	norm.	$\pm 2.36$	$\pm 2.99$	$\pm 1.83$

  
 \_\_\_\_\_  
 Wei Li  
 Lab Manager  
 Advanced Compliance Lab

Date September 17, 2012

## **1.2 Equipment Modifications**

N/A

**1.3 Product Information**

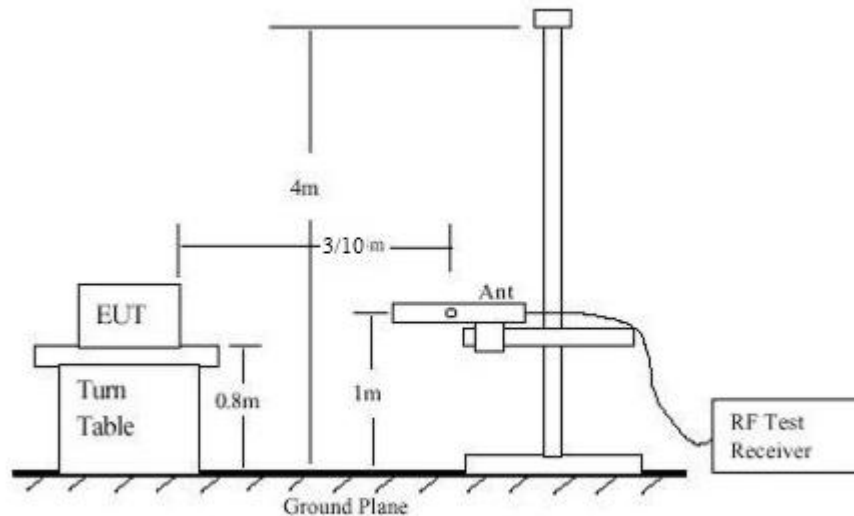
**System Configuration**

ITEM	DESCRIPTION	FCC ID	CABLE
Product	LOW FREQUENCY MONITOR (1)	ST2-DM34Y	
Housing	PLASTICS		
Power Supply	3V~6V DC Battery or AC/DC Adaptor: Input 110-120Vac, 50-60Hz, 0.15A; Output 18Vdc, 0.33A		
Operation Freq.	904MHz ~ 926MHz , 125KHz		
Receiver	2X34Y(RX)	Verification	

(1) EUT submitted for grant.

**1.4 Test Methodology**

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 31/0 meters.



Radiated Emission Measurement

**1.5 Test Facility**

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to

perform measurements under Part 15 or 18 in a letter dated May 19, 1997 (Refer to: 31040/PRV 1300F2). The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

### 1.6 Test Equipment

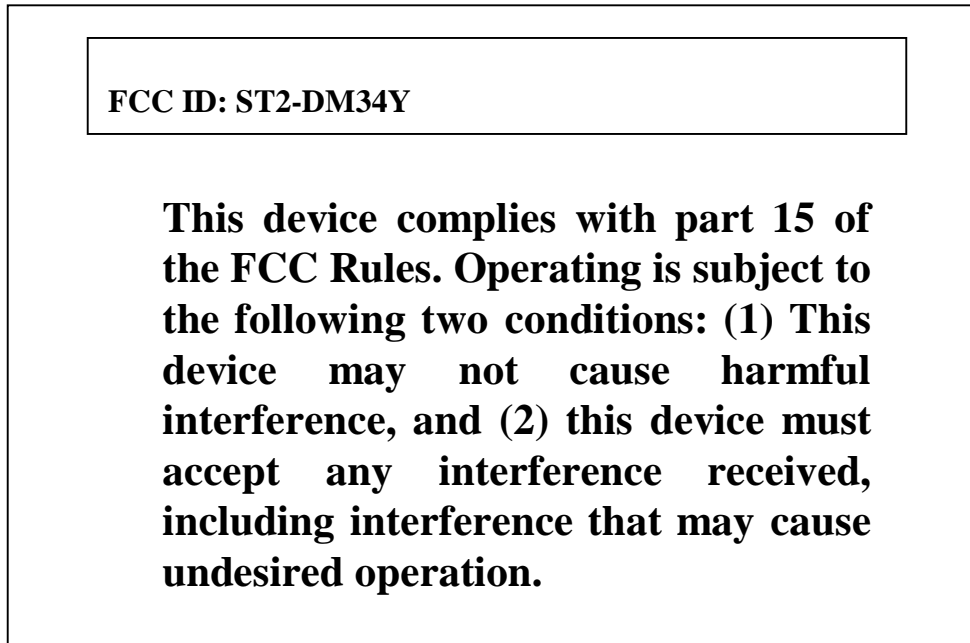
Manufacture	Model	Serial No.	Description	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	15/10/12
Agilent	E4440A	US40420700	3Hz-26.5GHz Spectrum Analyzer	25/8/13
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/13
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/13
ARA	MWH-1826/B	1013	18-26GHZ Horn Antena	10/2/2013
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/13
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	28/05/13
Fischer Custom	LISN-1	900-4-0008	Line Impedance Stabilization Networks	18/03/13
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	24/03/13

All Test Equipment Used are Calibrated Traceable to NIST Standards.

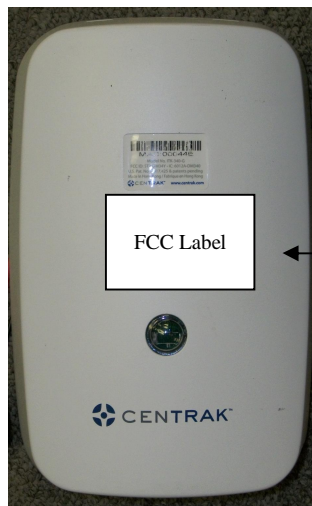
### 1.7 Statement for the Document Use

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

## 2. PRODUCT LABELING



**Figure 2.1 FCC ID Label  
(Only FCC ID shown on EUT)**



**Figure 2.2 FCC Label Location**



### **3. SYSTEM TEST CONFIGURATION**

#### **3.1 Justification**

The system was configured for testing in a typical fashion (as a customer would normally use it): It is attached to walls with vertical orientation. And its antenna was permanently attached to the EUT: wire type (max length 3") for 900MHz band & KGEA-BFCR LF Emitter antenna for 125KHz.

Testing was performed as EUT was continuously operated at the following frequency channels:

Low=904MHz, Middle= 915MHz, High=926MHz and  
Low Frequency channel=125KHz

DC power source provided by AC/DC adaptor ( as the worst case) or Fresh external battery was used for extended operating time.

#### **3.2 Special Accessories**

N/A

#### **3.3 Configuration of Tested System**

Figure 3.X illustrate this system, which is tested standing along.



**Figure 3.1 Radiated Test Setup (a)**





**Figure 3.1 Radiated Test Setup (b)**



**Figure 3.2 Conducted Test Setup (a)**



**Figure 3.2 Conducted Test Setup (b)**

## 4. SYSTEM SCHEMATICS

**See Attachment.**

Figure 4.1 System Schematics

## 5. CONDUCTED EMISSION DATA

### 5.1 Test Methods and Conditions

The EUT was under normal operational mode during the conducted emission test. EMI Receiver was scanned from 150KHz to 30MHz with maximum hold mode for maximum emission. Recorded data was sent to the plotter to generate output in linear format. At the input of the spectrum analyzer, a HP transient limiter is inserted for protective purpose. This limiter has a 10 dB attenuation in the range of 150KHz to 30MHz. That factor was automatically compensated by the receiver, so the readings are the corrected readings. The reference of the plot is the CISPR 22 Class B limit in Figure 5.1 through Figure 5.2.

Conducted Emission Technical Requirements				
Frequency Range	Class A		Class B	
	Quasi-Peak dBuV	Average dBuV	Quasi-Peak dBuV	Average dBuV
150kHz -0.5MHz	79 (8912uV)	66 (1995uV)	66-56	56-46
0.5MHz-30MHz	73 (4467uV)	60 (1000uV)	---	---
0.5MHz- 5MHz	---	---	56	46
5MHz-30MHz	---	---	60	50

Emissions that have peak values close to the specification limit (if any) are also measured in the quasi-peak mode to determine compliance.

### 5.2 Test Data

Figure 5.1 through Figure 5.2 show the neutral and line conducted emissions for the standard operation mode.

Highest Data for AC Main Conducted Emissions (w/ PC Connected)						
Frequency (MHz)	<b>0.24</b>	<b>0.380</b>	<b>0.73</b>	<b>0.81</b>	<b>1.07</b>	<b>1.27</b>
Peak Reading (dBuV) from Line*	54.02	49.34	49.13	48.18	41.33	49.64
Average Reading (dBuV) from Line*	32.89	10.10	29.92	4.05	6.4	3.46
Frequency (MHz)	<b>0.24</b>	<b>0.59</b>	<b>0.68</b>	<b>0.73</b>	<b>1.03</b>	<b>1.25</b>
Peak Reading(dBuV) from Neutral *	47.80	44.76	47.71	47.37	45.02	44.88
Average Reading (dBuV) from Line*	-	-	3.03	23.94	-	-

\* No QP reading is needed since the peak reading is already below QP limit.

Test Personnel: *E. Lee*

Typed/Printed Name: Edward Lee

Date: September 17, 2012

### Line Conducted Emission

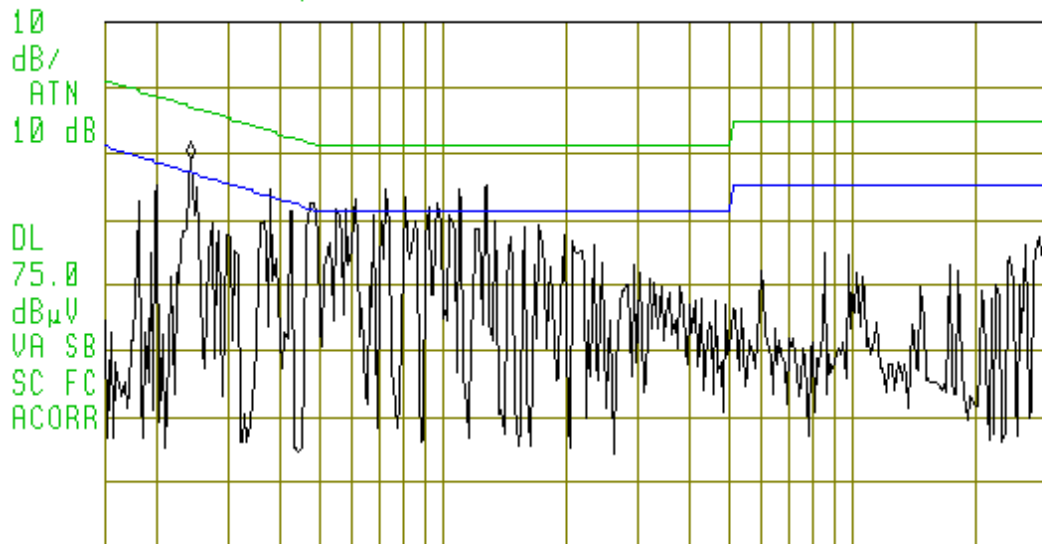
Frequency: 150kHz to 30MHz



MARKER  
240 kHz  
54.02 dB $\mu$ V

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 240 kHz  
54.02 dB $\mu$ V

LOG REF 75.0 dB $\mu$ V



#IF BW 9.0 kHz      AVG BW 30 kHz      SWP 2.49 sec



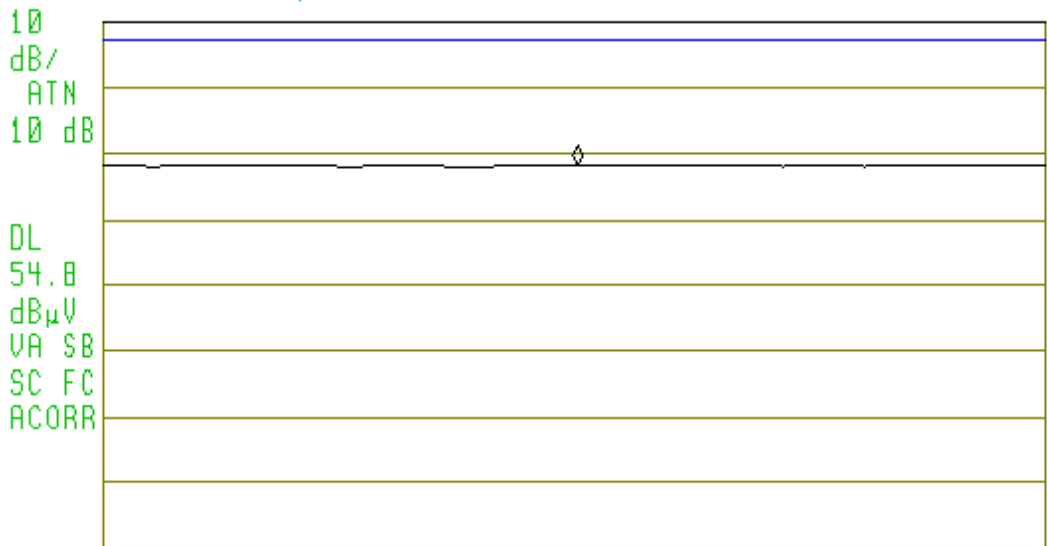
Average Reading at 240kHz



MARKER  
351.75 msec  
32.89 dB $\mu$ V

ACTV DET: AVG  
MEAS DET: PEAK QP AVG  
MKR 351.75 msec  
32.89 dB $\mu$ V

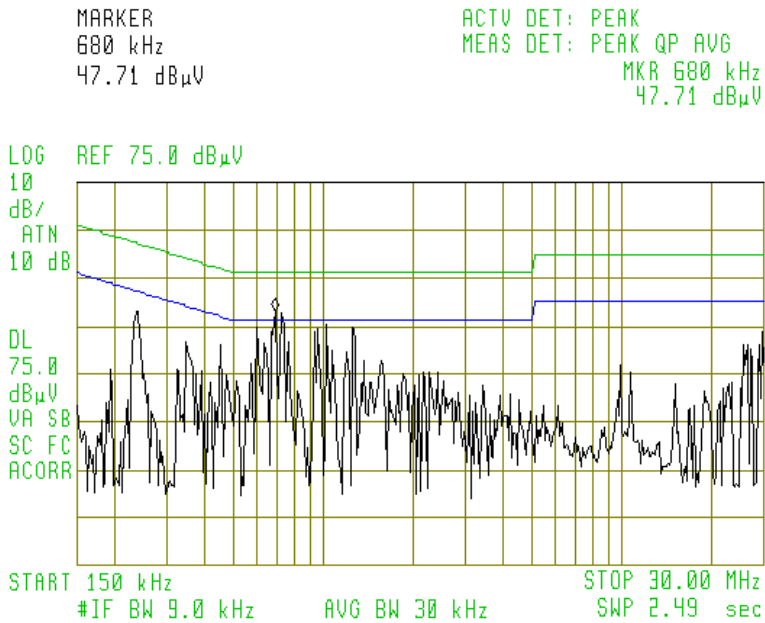
LOG REF 54.8 dB $\mu$ V



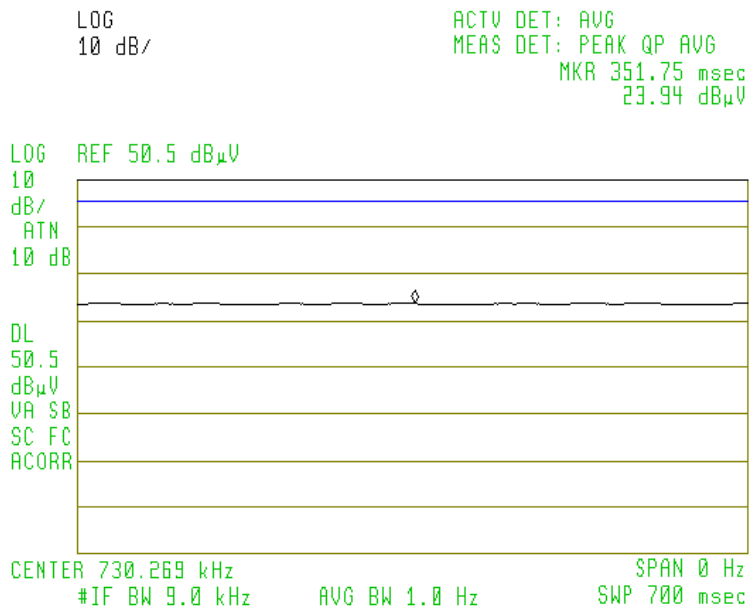
CENTER 240.885 kHz SPAN 0 Hz  
#IF BW 9.0 kHz AVG BW 1.0 Hz SWP 700 msec

### Neutral Conducted Emission

Frequency: 150kHz to 30MHz



Average Reading at 730kHz



## 6. RADIATED EMISSION DATA

### 6.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dB $\mu$ V/m

RA: Amplitude of EMI Receiver before correction in dB $\mu$ V

AF: Antenna Factor in dB/m

CF: Cable Attenuation Factor in dB

AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

THE "DUTY CYCLE CORRECTION FACTOR" FOR SPURIOUS RADIATED EMISSIONS IS;  
 $20 \log * (4 \text{ ms} / 100 \text{ ms}) = -28 \text{ dB}$ , WHICH WAS USED TO CORRECT THE AVERAGE RADIATED EMISSION READINGS.

### 6.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range 30MHz - 1GHz, 100KHz IF bandwidth / 100KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. The radio spectrum was investigated from the lowest frequency generated within the device (without going below 9 kHz) up to the 10<sup>th</sup> harmonic of the rated transmitted emission.

### 6.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 5.1.

Test Personnel:   
 \_\_\_\_\_

Typed/Printed Name: Edward Lee

Date: September 17, 2012

## A1. 900MHz Band Transmission Radiated Test Data

### A1.1 EUT at Vertical Orientation

#### Fundamental and Harmonics at CH-904MHz/915MHz/926MHz

Frequency (MHz)	Antenna Polarity (V,H) Position Z	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
904	V	1.1	000	88.7		94	-5.3
1808	V	1.1	000	57.2	29.2	54	-24.8
2712	V	1.0	180	58.3	30.3	54	-23.7
904	H	1.1	315	88.0		94	-6.0
1808	H	1.1	090	53.7	25.7	54	-28.3
2712	H	1.0	000	56.2	28.2	54	-25.8
915	V	1.1	000	88.3		94	-5.7
1830	V	1.1	090	55.7	27.7	54	-26.3
2745	V	1.0	045	56.1	28.1	54	-25.9
915	H	1.1	315	86.3		94	-7.7
1830	H	1.1	000	52.1	24.1	54	-29.9
2745	H	1.0	330	56.7	28.7	54	-25.3
926	V	1.1	000	89.1		94	-4.9
1852	V	1.1	090	55.1	27.1	54	-26.9
2778	V	1.0	270	55.5	27.5	54	-26.5
926	H	1.1	270	86.1		94	-7.9
1852	H	1.1	090	53.4	25.4	54	-28.6
2778	H	1.0	330	55.0	27.0	54	-27.0

(1) The limit for emissions within the 902-928MHz band is 50mV(94dB) per Sec. 15.249. The limit for its harmonics is 500uV (54dB). Other spurious emissions shall be lower than either its fundamental by 50dB or the limit defined in Sec. 15.209, whichever is higher.

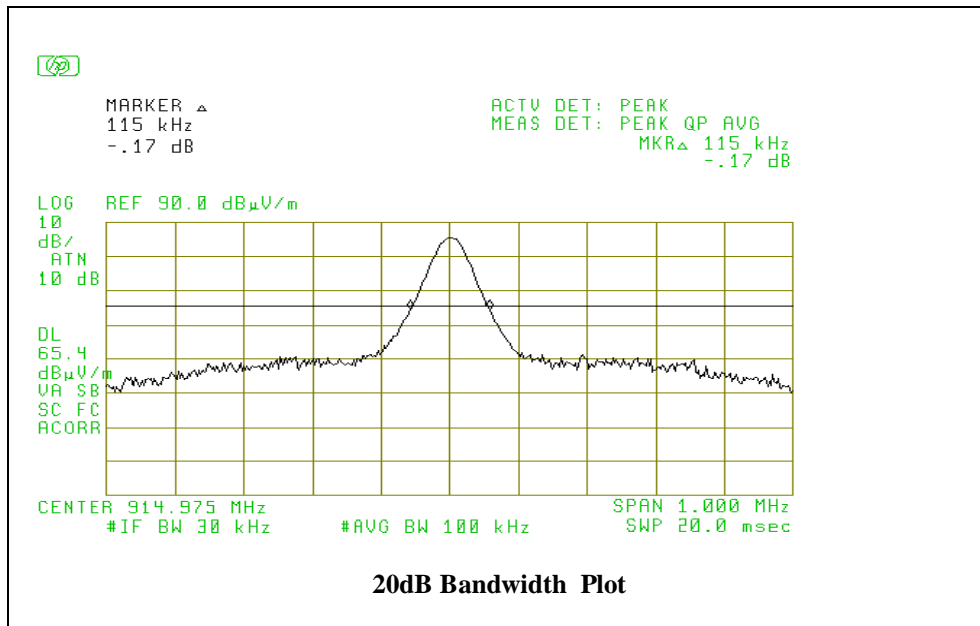
(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.

**Other Spurious outside of the band 902-928MHz**

Frequency (MHz)	Polarity (V,H) Position Z	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
462.5	V	1.1	200	35.6	46.5	-10.9
575.0	V	1.1	260	34.5	46.5	-12
890.3	V	1.1	170	36.7	46.5	-9.8
928.4	V	1.0	180	36.5	46.5	-10
368.8	H	1.0	100	32.3	46.5	-14.2
469.4	H	1.0	020	36.1	46.5	-10.4

Comparing to the limit defined in Sec. 15.209, emissions below the limit by 20dB were not recorded.

**20 dB Bandwidth : 900MHz Band**



## A1.2 EUT at Horizontal Orientation

### Fundamental and Harmonics at CH-904MHz/915MHz/926MHz

Frequency (MHz)	Antenna Polarity (V,H) Position Z	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
904	V	1.1	045	84.9		94	-9.1
1808	V	1.1	180	58.9	30.9	54	-23.1
2712	V	1.1	180	54.0	26	54	-28.0
904	H	1.0	180	85.6		94	-8.4
1808	H	1.1	090	61.7	33.7	54	-20.3
2712	H	1.0	090	62.4	34.4	54	-19.6
915	V	1.1	045	85.2		94	-8.8
1830	V	1.1	000	58.4	30.4	54	-23.6
2745	V	1.1	090	53.7	25.7	54	-28.3
915	H	1.0	225	83.7		94	-10.3
1830	H	1.1	000	61.3	33.3	54	-20.7
2745	H	1.0	000	61.8	33.8	54	-20.2
926	V	1.1	090	85.7		94	-8.3
1852	V	1.1	000	58.5	30.5	54	-23.5
2778	V	1.1	090	52.9	24.9	54	-29.1
926	H	1.0	225	81.9		94	-12.1
1852	H	1.1	000	61.0	33	54	-21.0
2778	H	1.0	000	61.5	33.5	54	-20.5

(1) The limit for emissions within the 902-928MHz band is 50mV(94dB) per Sec. 15.249. The limit for its harmonics is 500uV (54dB). Other spurious emissions shall be lower than either its fundamental by 50dB or the limit defined in Sec. 15.209, whichever is higher.

(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.

**Other Spurious outside of the band 902-928MHz**

<b>Frequency (MHz)</b>	<b>Polarity (V,H) Position Z</b>	<b>Antenna Height (m)</b>	<b>Azimuth (Degree)</b>	<b>Peak Reading at 3m (2) (dBuV/m)</b>	<b>FCC 3m Limit (1) (dBuV/m)</b>	<b>Difference (dBuV/m)</b>
460.5	V	1.1	180	33.0	46.5	-13.5
575.0	V	1.1	235	31.1	46.5	-15.4
760.0	V	1.0	180	35.4	46.5	-11.1
890.3	V	1.0	180	35.0	46.5	-11.5
338.4	H	1.1	000	31.5	46.5	-15.0
468.8	H	1.1	270	33.9	46.5	-12.6

Comparing to the limit defined in Sec. 15.209, emissions below the limit by 20dB were not recorded.

## A2. 125KHz Transmission Radiated Test Data

EUT is powered by AC/DC adaptor and represents the worst case

### A1.1 EUT at Vertical Orientation

Frequency (MHz)	Polarity (V,H) Position Z	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC Limit@ 3m (1) (dBuV/m)	Difference (dBuV/m)
0.125	Loop	1.0	030	95.3		105.6	-10.3
0.251	Loop	1.0	010	83.8		99.6	-15.8
0.495	Loop	1.0	020	67.5		73.7	-6.2
0.748	Loop	1.0	340	64.3		70.1	-5.8

### A1.2 EUT at Horizontal Orientation

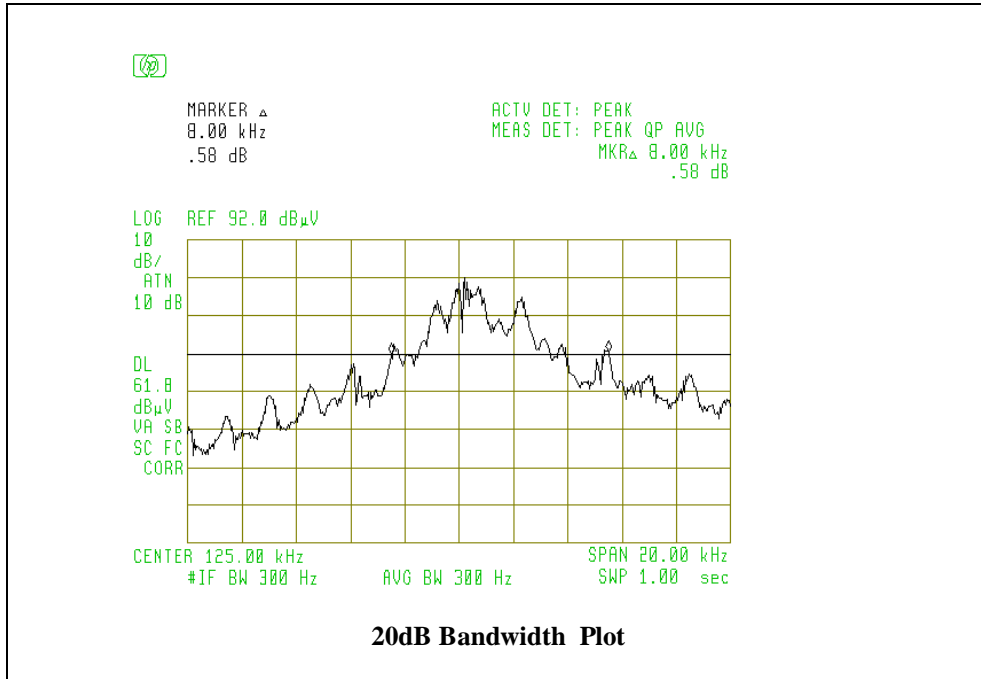
Frequency (MHz)	Polarity (V,H) Position Z	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC Limit@ 3m (1) (dBuV/m)	Difference (dBuV/m)
0.125	Loop	1.0	030	95.3		105.6	-10.3
0.251	Loop	1.0	010	83.8		99.6	-15.8
0.495	Loop	1.0	020	67.5		73.7	-6.2
0.748	Loop	1.0	340	64.3		70.1	-5.8

(1) The limit for emissions per Sec. 15.249 with distance correction factor (40dB/decade at  $f < 30\text{MHz}$ ).

(2) If each peak reading is less than the FCC QP or average limit, it'll be not necessary to show the measured/ calculated QP or average reading (QP detector shall be used except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, in which an average detector shall be employed).



20 dB Bandwidth at 125KHz



## 6.4 EUT RECEIVING MODE VERIFICATION

### Radiated Test Data for 900MHz Band Transmission Receiving Mode (vertical orientation as worst case)

Frequency (MHz)	Polarity (H or V)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m(2) (dBuV/m)	FCC 3m Limit(1) (dBuV/m)	Difference (dBuV/m)
119.7	H	1.4	120	31.5	43.5	-12.0
147.8	H	1.4	200	32.8	43.5	-10.7
164.5	H	1.5	220	33.6	43.5	-9.9
330	H	1.1	080	35.2	46.5	-11.3
120.0	V	1.1	180	32.6	43.5	-10.9
163.5	V	1.1	170	33.5	43.5	-10.0
328.7	V	1.1	075	35.1	46.5	-11.4
758	V	1.1	120	36.4	46.5	-10.1

(1) Receiving mode spurious emissions shall be lower than the limit defined in Sec. 15.209.

(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.